Introduction to the Geology of Hanging Rock State Park

By carefully observing the **rocks** at Hanging Rock State Park, geologists have pieced together their geologic history. Remember that as research continues, geologists will modify or revise this version of the earth's history.

Over 800 million years ago during the Proterozoic **eon**, the **Iapetus Sea** was located off the east coast of what was then the North American continent. **Sandstones** and other **sedimentary rocks** formed slowly here as layer upon layer of **sand**, silt and mud was deposited.

We can see evidence of the ancient sea preserved in the rocks at the park. Some rocks preserve the original bedding (layering), as well as **cross-bedding** where the **sediment** layers are aligned at an angle to one another. Cross-bedding usually occurs in a nearshore environment. Here, sand-carrying currents of water and wind frequently change direction.

The next series of geological events that contributed to the formation of the **Sauratown Mountains** can be traced to movements in the earth's crust. About 500 million years ago, the **crustal plates** carrying the continents of North America and Africa began to move toward each other. As the Iapetus Sea closed, the sandstones and other sedimentary rocks were folded and metamorphosed. The **quartzite** found in the park today is this metamorphosed sandstone. In other parts of the Sauratowns, you can find **schist** and **gneiss**; these rocks probably resulted from the metamorphism of shale and mudstones.

Between 250 and 500 million years ago, the entire region was gradually pushed up to heights that would rival today's Rocky Mountains. Originally the layers of rock were lying horizontally like a stack of papers; however, as the earth's surface moved, the layers were gradually folded and bent. Older layers of rock were thrust up and over younger layers. Today, the Sauratown Mountains represent the axis of a giant fold in the crust that geologists call the Sauratown Mountain **anticlinorium**. (An anticlinorium is an area where the rocks were arched upwards.)

During crustal movement, the rocks behaved like taffy candy. Today these rock layers are sloping or dipping gently to the southeast on one side of the anticlinorium and to the northwest on the other side. **Fractures** show up clearly in the cliffs of the upper ridges, the Upper Cascades, and especially well at Hidden Falls. Along these fractures, smooth-sided blocks of quartzite break out of the cliffs like building blocks.

Other products of the mountain-building period are the **quartz** veins found throughout the quartzite rock. During metamorphism, solutions of hot water were squeezed between the beds or layers in the quartzite. As the water cooled, silica precipitated out and solidified to create the quartz veins.

About 220 million years ago, the continents of North America and Africa began to pull apart. The Atlantic Ocean formed, as well as many rift valleys and Triassic basins, including the Dan River basin. At this time, **weathering** and **erosion** became the dominant forces acting on the Sauratown Mountains.

Over millions of years, erosion has removed the softer rocks and exposed the more resistant quartzite, which forms the ridge line of the Sauratown Mountains. Each time it rains or the wind blows, a little more of the mountains are carried away. Some of these sediments travel down the Dan River on their way to the Atlantic Ocean. Eventually, these mountains will disappear sometime in the distant future of geologic time.